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MANAGING THE RISK FOR EARLY ONSET OSTEOPOROSIS IN LONG-DURATION ASTRONAUTS DUE TO SPACEFLIGHT. J.D. Sibonga, Ph.D. , NASA Johnson Space Center, Houston, TX

Early Onset Osteoporosis is probably the most recognized but poorly understood long-term health risk due to spaceflight. Osteoporosis management is primarily prophylactic and clinical interventions rely upon the ability to predict fractures which is currently determined by surrogate measures of bone strength. The RMAAT for Early Onset Osteoporosis identified some open issues related to the fact that long-duration astronauts compose a unique group of subjects for which clinical approaches for osteoporosis management do not apply. Long-duration astronauts are healthy, young (25 to 55 years of age), predominantly male, and physical fit relative to the typical osteoporosis patient. Moreover, during prolonged space missions (typically 6-month missions) the skeleton not only adapts to weightlessness, but is influenced by numerous risk factors induced by operational constraints, e.g., inability to maintain preflight weight-bearing and aerobic activities, sub-optimal dietary intake (e.g., high sodium content for food stability, lack of fresh fruit and vegetables), suppression of vitamin D metabolism by UV shielding, and remote medicine care. Moreover, adaptation results in novel changes to astronauts' bones that cannot be detected by current medically-useful measures. Consequently, a panel of clinicians (recognized leaders and policy-makers in osteoporosis) was convened to review the dataset of bone measures and bone loss risk factors in long-duration astronauts. Driven by the queries in the RMAAT, the panel was charged to determine 1) if an intervention is required to prevent this risk, 2) what type and at what time would intervention be optimal, 3) what is the clinical trigger that would require a medical response from flight surgeons and 4) how should research data be used in the clinical care of astronauts. Hence, the RMAAT determined that a bone health policy need to be formulated specific for this unique cohort subjected to a novel skeletal condition.